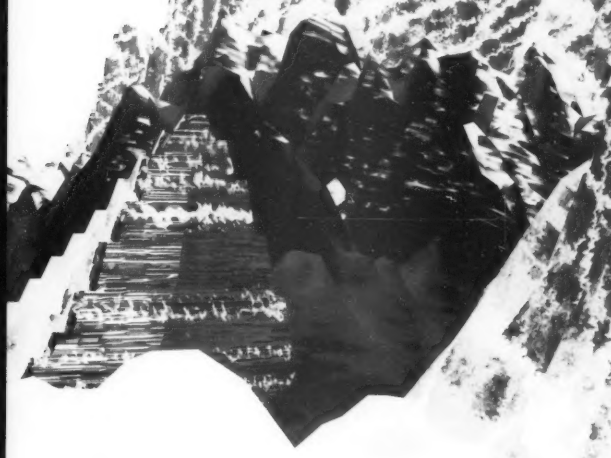
FAA Aviation News

NOVEMBER/DECEMBER 1995

AVIATION SAFETY FROM COVER TO COVER



happy holidays

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FAA Aviation news

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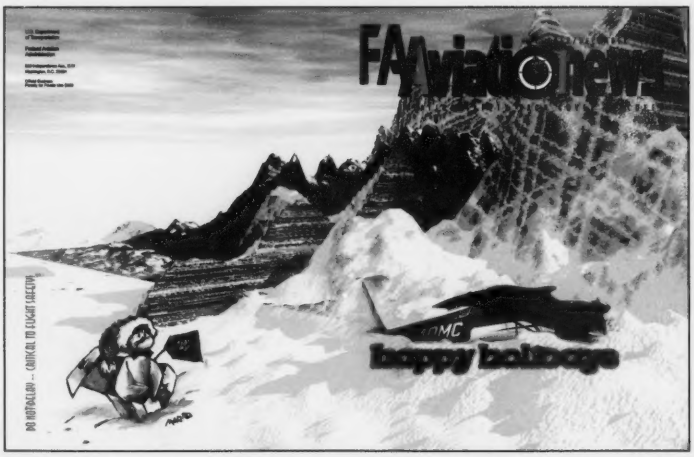


COVER: Don't let yourself get "snowed in" this winter like the airplane on the front cover. Get up to date on winter operations with this issue. Happy Holidays to all from the Aviation News Staff.

http://www.faa.gov/avr/news/newshome.htm
Aviation Safety Program:
http://www.faa.gov/avr/news/asphome.htm

Part 2

ROLL UPSET IN Severe Icing

by John P. Dow, Sr.

Part 1 of this article appeared in the October 1996 issue of FAA Aviation News *and contained a background discussion of supercooled large drops (SLD) and aircraft certification for icing conditions as well as some information on future icing detection and protection systems. If you did not see Part 1, please contact Ms. Brenda Howard at (202) 267-7065 or request a back copy of the October 1996 issue via e-mail at Phyllis.Duncan@faa.dot.gov*

Historical Perspective

Traditionally, the industry has relied upon the infrequency of occurrence, limited extent of coverage, forecasting, and reporting to avoid freezing rain and freezing drizzle and recognition to exit the conditions.

Forecasting

Supercooled Drizzle Drops (SCDD) are a new challenge. Like freezing rain and freezing drizzle, SCDD conditions generally tend to be limited in horizontal and/or vertical extent. There is substantial effort being placed into improving forecasts for all SLD. Starting in the fall of 1995 there were preliminary changes to mathematical models used to forecast these conditions. The models will be reviewed and updated periodically based on

correlation with observations and PIREP's. More extensive work in forecasting accuracy is being planned.

Pilot Reports (PIREP)

Pilots are best situated to submit a real-time report of actual icing conditions. Yet, the most obvious factor about the efficacy of a PIREP is that there is no assurance another airplane will transit that small volume of the sky containing SLD. If it does, there must be some way for the pilot to identify that the icing is because of SLD and then submit the PIREP. All pilots may not be sensitive to what SLD icing looks like on their airplanes, and PIREP's are not the highest priority at periods of high cockpit workload.

Even if the same volume of the sky happens to be sampled by another airplane, there are many variables involved in the reported encounter that may not reflect the potential hazard of the cloud for other airplanes.

The obvious differences are the size and type of the other airplane's airfoil, configuration, speed, angle-of-attack, etc. If the other airplane happens to be larger, the effect of icing may have been unnoticed and unreported but could be a problem for a smaller airplane.

PIREP's from an identical model airplane are most likely to be representative, but even the same airplane climbing through an icing layer would likely result in a different ice accretion than one descending.

As a forecast projects what may be, a PIREP chronicles what was. PIREP's are very useful in establishing a heightened sense of awareness to a possible icing condition and are very valuable to aid forecasters in correlating forecast meteorological data with actual ice. The most important issue is—"What is the icing condition right now?"

What is...?

For the present, the pilot is the best means of determining "what is..." if he or she has usable guidelines.

One airline in an island environment with unique atmospheric conditions reports that they periodically encounter and safely exit SLD conditions because of knowledgeable and vigilant crews.

Experienced crews rely on visual cues to determine the presence of SLD. Once the pilots detect the cues, they exit the condition. Since SLD conditions tend to be localized, the procedure has proved to be practical and safe. It does require alertness to existing conditions and a working knowledge about the airplane and the weather. Working knowledge of the weather implies that pilots know what the temperatures and conditions are likely to be to the left, right, ahead, behind, above, and below the route of flight and what severe icing looks like.

Why Is Some Ice Severe or "Bad?"

Ice accreted beyond ice protection system coverage will not be shed and will continue to accrete until the airplane exits the icing conditions. Remaining in such icing conditions cannot improve the situation.

Rime/Clear/Mixed

Extent of ice accretion, shape, roughness, and height are the most important factors in the effect on an airfoil. Unfortunately operational descriptors of rime, clear, or mixed are not adequate to convey accurately nuances of the icing environment and the hazards of SLD. Ice forming aft of the boots may be white, milky, or clear. Non-hazardous ice may also be described using the same terms. In the same cloud, one airplane may accrete rime while another—at a higher speed—accretes mixed ice. Rime and clear ice may also accrete on an airfoil at the same time. With the potential for ambiguity, meaningful terminology is an issue that must be addressed.

Trace, Light, Moderate, or Severe

Severity indices of trace, light, moderate, and severe vary among airplanes for the same cloud and tend to be subjective. Not too far from the Roselawn, Indiana accident site at about the same time as the 1994 accident (see Part 1), a jet airplane experienced a rapid ice accretion. Its captain said that he never experienced ice build-up that fast before. One inch of milky ice accumulated on a thin, rod-shaped projection from the center windshield in one to two minutes. It was reported to be light rime. In these extraordinary conditions, does "light" icing convey a message to others suggesting vigilance or complacency?

How Can Ice Affect Roll Attitude?

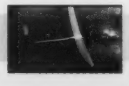
Ice can contribute to partial or total wing stall followed by roll, aileron snatch, or reduced aileron effectiveness.

Wing stall is not an uncommon consequence of ice accretion. Ice from freezing drizzle can form sharp-edged, rough elements approximately five to 10 mm high over a large chordwise expanse of the wing's lower surface (perhaps covering 30 to 50%) and increase fuselage drag dramatically, thereby reducing speed. Correcting for this demands increased power, increased angle of attack, or both to maintain altitude. Ultimately, such unmitigated adjustments lead to exceeding the stall angle of attack and a conventional stall, likely followed by a roll.

Aileron "snatch" is a descriptive term that results from an imbalance in the sum of the product of aerodynamic forces at an angle of attack that may be less than wing stall, one that tends to deflect the aileron away from the neutral position. On unpowered controls, it is felt as a change in control wheel force. Instead of requiring force to deflect the aileron, it requires force to return the aileron to the neutral position.

All else equal, smaller ailerons would have smaller snatch forces. Aileron instability sensed as an oscillation, vibration, or buffet in the control wheel is another tactile cue that the flow field over the ailerons is disturbed.

While flight testing using simulated



ice shapes on the ATR (intending to simulate the conditions at Roselawn) demonstrated that these forces were less than the 60-pound certification limit for temporary application in the roll axis, the sudden onset and potential to cause a rapid and steep roll attitude excursion was unacceptable. FAA investigation has revealed similar roll attitude excursion affecting other aircraft types that are equally unacceptable.

Ailerons that exhibit the "snatch" phenomenon have control wheel forces that deviate from their normal relationship with aileron position. However, the ailerons may be effective when they are deflected.

Loss of roll control effectiveness is a different situation and in some ways may be more difficult. Because of flow disruption over the wing ahead of the ailerons, the controls do not produce the rolling moments associated with a given deflection and airspeed.

When reduction or loss of aileron control because of ice is experienced, it may or may not be accompanied by abnormally light control forces. If the airplane is displaced in roll attitude, for instance, caused by partial stall because of ice, the pilot's efforts to correct the attitude by aileron deflection are defeated by lack of effectiveness.

Roll upset from any cause is totally unacceptable. How can it occur?

Wing Tip Stall!

Ice tends to accrete on airfoils in different ways, depending on the airfoil, the angle of attack, other aircraft variables, and, of course, the atmospheric variables controlling the size, density, temperature, etc., of the water droplets. Similarly, the ice has differing effects on the airfoils.

The implications of all this can be illustrated with a wing. Consider the airfoil at the tip as a different airfoil than at the root—in all probability it is different. It is probably thinner, may have a different camber, be of shorter chord, and, more than likely, have two or three degrees of twist or washout relative to the root section.

Because the tip section may have a sharper nose radius and most likely has a shorter cord, it is a more efficient ice collector. As a result of the above differences, ice accretion at the wing tip may be thicker, extend further aft, and have a greater adverse effect than ice at the root.

Twist or washout helps to ensure that, at least, the symmetric stall starts inboard and spreads in a progressive fashion so that roll control is not lost. Greater ice accretion has probably occurred at the tip, leaving it more impaired aerodynamically than the inboard wing sections. *Stall, instead of starting inboard, may start at the tip.*

Even if the ice does build up at the root to nearly the same thickness as that at the tip, it still tends to affect the smaller chord section, such as the wing tip, more adversely.

Power effects can aggravate tip-stall. The effect of the propeller is to reduce the angle of attack of the section of the wing behind it. At high power settings, stall on the inner wing tends to be delayed by propwash. But the outer wing doesn't see the same flow field, so it tends to stall sooner.

Safety margins for the above factors in normal icing conditions are eroded when ice forms aft of the ice protection systems!

Finally, because of the outer wing's greater distance from the flight deck, the crew may have difficulty in assessing ice there.

The result of all this means that at some angle of attack, the outer wings may have at least a partially separated flow, while normal flow conditions still prevail over the inner parts of the wing. If a stall occurs, there may be no pronounced "g" break, and the pilot may not sense the stall—hence, it is insidious. The partial flow separation also accounts for a degree of loss of aileron effectiveness. Apart from control or handling anomalies, asymmetric lift loss may occur suggesting the perception that one wing is "heavy."

Where Does Ice Accrete?

Where ice builds up on a given airfoil depends on the angle of attack, airspeed, and icing variables. For example, during the icing tanker testing of the ATR-72 at Edwards AFB, while flying in drizzle-sized drops at the test airspeed, ice would predominantly build on the upper surface of the wing with the flaps extended to 15° (ergo, smaller angle of attack) and predominantly on the lower surface of the wing with the flaps retracted (larger angle of attack). (This testing was part of the Roselawn accident investigation.)

In the upper surface case, there was little drag increase until separation. On the lower surface, the expanse of rough ice was accompanied by a substantial drag increase.

In an icing environment, the propeller wash also tends to influence icing impingement on the airfoil. Unless the propellers are counter-rotating, the flow field is asymmetric over the wings, and ice impingement tends to be slightly asymmetric as well.

Recovery

Once airflow separation occurs, reattaching flow generally requires a marked reduction of angle of attack and then refraining from increasing the angle of attack to the stall angle for that part of the wing. This characteristic is configuration-dependent and is not limited to just one airplane type.

As an example, in the case of two different airplane types studied in detail, the stall angle for the outer wings is about 5° with ice accretion forward of the ailerons on the upper wing surfaces aft of the deicing boots. The normal stall angle is near 20° with no ice accretion. In both cases, reattachment of flow occurs when the angle of attack is reduced to substantially less than the stall angle. Applying power and maintaining attitude may not be most effective in recovering from an outer wing stall since the reduction in angle of attack does not occur as rapidly.

Detecting SLD—Cues

The general information that follows is intended to assist pilots in identifying and exiting inadvertent encounters

with SLD conditions. ***The suggestions below are not intended to be used to prolong exposure to icing conditions but are a warning to exit the conditions immediately.*** Importantly, because of the broad range of environmental conditions, limited data available, and various airplane configurations, the manufacturer's AFM/POH should be consulted for guidance on a specific type.

The most effective means to identify severe icing are cues that can be seen, felt, or heard.

- *Ice visible on the upper or lower surface of the wing, aft of the active part of the deicing boots.* It may be helpful to look for irregular or jagged lines or pieces of ice that are self-shedding. For contrast, a portion of the wing may be painted a dark color with a matte finish—different from the color of the boots. The matte finish can help in identifying initial formation of SLD ice which may be shiny. All areas to be observed need adequate illumination for night operations.

- *Observe the aft limit of ice accretion on the propeller spinner.* Non-heated propeller spinners are useful devices for sorting droplets by size. Similar to a white wing, a polished spinner may not provide adequate visual contrast to detect SLD ice. If necessary, a dark matte circumferential band may be painted around the spinner as a guide.

- *Granular, dispersed ice crystals or totally translucent or opaque coverage of the unheated portions of the front or side windows.* This may be accompanied by other ice patterns on the windows such as ridges. These patterns may occur within a few seconds to half a minute after exposure to SLD conditions.

- *Unusually extensive coverage of ice*, visible ice fingers, or ice feathers on parts of the airframe not normally covered by ice.

At temperatures near freezing, other details take on new significance:

- *Visible rain* (which consists of very large water droplets). In reduced visibility conditions occasionally select taxi/landing lights ON. Rain may also be detected by sound of impact.

- *Droplets splashing or splattering on impact with the windshield.* Droplets covered by the icing certification envelopes are so small they are usually below the threshold of detectability. The largest size of the drizzle drops is about the diameter of a 0.5mm mechanical pencil lead.

- *Water droplets or rivulets* streaming on the heated or unheated windows may be an indication of high LWC of any size droplet.

- *Weather radar returns* showing precipitation suggest increased vigilance is warranted for all of the cues. Evaluation of the radar display may provide alternative routing possibilities.

Preventive and Remedial Measures

Before Takeoff

Know the PIREP's and the forecast where potential icing conditions are located in relation to the planned route and which altitudes and directions are likely to be warmer/ colder. About 25% of the cases of SLD are found in stratiform clouds colder than 0°C at all levels, with a layer of horizontal wind shear at the cloud top. There need not be a warm melting layer above.

In-Flight

Maintain awareness of outside temperature. Know the freezing level (0°C SAT). Be especially alert for severe ice formation at a TAT near 0°C or warmer (when the SAT is 0° or colder). Many icing events have been reported at these temperatures.

Avoid exposure to SLD icing conditions (usually warmer than -10°C SAT but possible to -18°C SAT). Normally, temperature decreases with each 1,000-foot increase in altitude between approximately 1-1/2°C for saturated air to 2-3/4°C for dry air. In an inversion, temperature may increase with altitude.

When Exposed to Severe Icing Conditions

Disengage the autopilot—*hand fly the airplane.* The autopilot may mask important handling cues or may self-disconnect and present unusual attitudes or control conditions.

Advise ATC and promptly exit the conditions using control inputs as smooth and as small as possible.

Change heading, altitude, or both to find an area warmer than freezing, substantially colder than the current

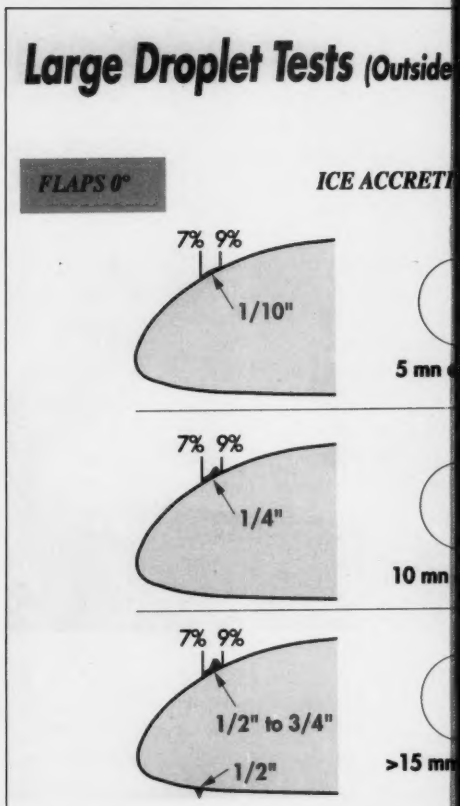
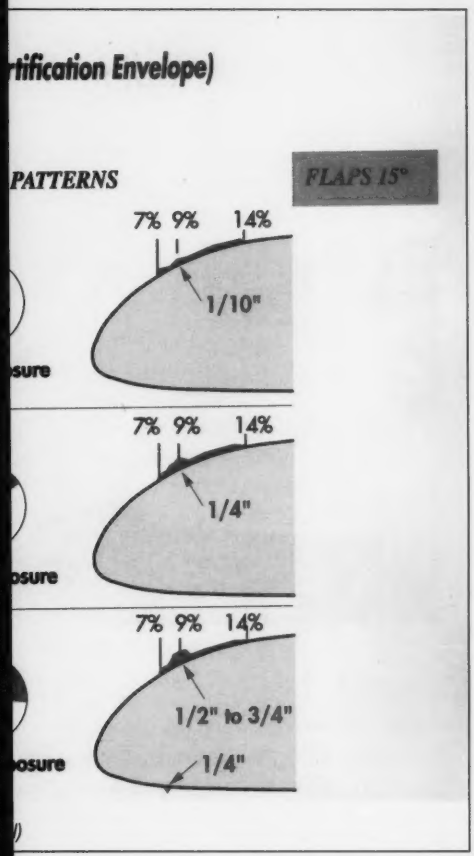


Diagram courtesy of ATR (Avions de Transport Reg



ambient temperature, or clear of clouds.

In colder temperatures, ice adhering to the airfoil may not be completely shed. It may be hazardous to make a rapid descent close to the ground to avoid severe icing conditions.

When severe icing conditions exist, reporting may assist other crews in maintaining vigilance. Submit a PIREP on the observed icing conditions. It is important not to understate the conditions or effects.

If Roll Control Anomaly Occurs

Reduce angle of attack by increasing airspeed or extending wing flaps to the first setting if at or below the flap extension speed (Vfe). If in a turn, roll wings level.

Set appropriate power and monitor airspeed and angle of attack. A controlled descent is a vastly better alternative than an uncontrolled descent.

If flaps are extended, do not retract them unless it can be determined that the upper surface of the airfoil is clear of ice. Retracting the flaps will increase the angle of attack at a given airspeed.

Verify that wing ice protection is functioning normally and symmetrically by visual observation of the left and right wing. If not, follow manufacturer's instructions.

Summary

Roll upset may occur because of asymmetric lift loss, as a consequence of a wing stall or before wing stall because of anomalous control wheel forces that cause the ailerons to deflect, or because the ailerons have lost effectiveness. The latter two may be caused by ice accreting in a sensitive area of the wing aft of the deicing boots under unusual conditions associated with SLD and rarely—normal cloud droplets—in a very narrow temperature range near freezing.

Pilots can minimize the chance of a roll upset by being sensitive to cues that identify severe icing conditions then promptly exiting the icing conditions before control or handling characteristics of the airplane are degraded to a hazardous level.

In the longer term ice protection equipment may be certificated for all—or part—of the SLD spectrum, or systems may be installed to help the crew detect the formation of ice or determine its effects.

It is important to review the airplane's AFM for aircraft type-specific information. Also look for icing-related bulletins from the airplane manufacturer.

If you have questions or comments, please contact Mr. Dow at (816) 426-6932; fax: (816)426-2169; or e-mail john.dow@faa.dot.gov .

TEMPERATURE?

Static air temperature (SAT) is what would be measured from a balloon and is the temperature given in a forecast or report. It is also referred to as outside air temperature (OAT).

Total air temperature (TAT) is obtained by a probe having velocity with respect to the air. Because of kinetic heating on the upstream side of the probe, TAT is warmer than SAT. SAT is computed from TAT and other flight conditions by an air data computer for dry air. There is less kinetic heating in saturated air than dry air.

Indicated outside air temperature (IOAT) is measured by a simple sensor in the airstream—essentially a thermometer. Typically, IOAT values will be SAT or OAT plus approximately 80% of the difference between SAT and TAT.

Surface temperature varies with pressure along the airfoil. At the leading edge where pressure is the highest, the surface temperature will also be higher than further aft. If the local surface temperature on the airfoil is warmer than freezing, no ice will form. Infrared measurements of a typical airfoil in the icing tunnel at a true airspeed of 150 knots show that there can be a decrease in temperature of more than 3.5°F along the airfoil. At temperatures close to freezing, there may be no ice on the leading edge, but ice can form further aft because of the lower temperatures. Because there is liquid runback, any ice formation aft of the leading edge tends to act like a "dam" making ice growth more rapid.

The Not So Thanksgiving Feast

by Jerry Wyatt

This article appeared in the Louisville FSDO's January/February 1996 Aviation Safety Program newsletter and that ASP/editor's note at the end sums up our feelings too.

WARNING: THIS ARTICLE IS VERY GRAPHIC.

It's still dark when the phone rings. I pull back the curtains to find snow still falling from last night's freakish, unforecasted storm. Thanksgiving snow. Holidays can be hard on Aviation Safety Inspectors. I have a gut feeling about the early morning wake-up call. I am about to receive some more on-the-job training.

I'm new to this job. I've only been with the FAA for three months. And this will not be the first airplane accident I've helped investigate. Three months ago I was on the other side of the aviation fence, in the "Real World." During my short tenure as a "FED" my preconceived ideas of the meaning of "Safety" have been radically altered.

Aviation Safety Inspector. It's nice sounding title. Safety. The word connotes things that should be done, not necessarily things that must be done. Things I really should do but don't because it will never happen to me. Safety. Not quite synonymous with the scarf and goggles machismo associated with aviators. Besides, those superfluous safety aspects are usually expensive and always bothersome. They do not belong in the real world.

"There's been another accident with fatalities. Wear old clothes. There's still body parts," the voice on the other end of the phone warns. My wakening mind tries to sort out this cryptic information.

This will be the second "fatal" I have investigated this week. Holidays. People just have to get where they want to go. And it is all so unnecessary. This is not fair. I have had no formal training in accident investigation yet. No one showed me how to deal with the gruesomeness associated with these catastrophes. Perhaps there is no course of instruction that could prepare you for such violations of your senses. That is why I have been exposed to these sights. It is a sink or swim situation. I am not expected to accept these vulgarities. But I must find a way to deal with them.

Three months ago I was reveling in aviation's beauty. Now I am groveling

in its mire. I have been told I have a knack for piecing together the events leading to an accident and thus aid in the determination of its cause. The compliment leaves me with twisted emotions. I have taught many pilots how to fly. I learned to empathize with my students to help solve their problems. The outcome then was the successful completion of a certificate or rating. I have discovered that I can apply this same sense of empathy, this gut feeling, to the accidents I investigate. I attempt to put myself in the cockpit, inside the pilot's head, and feel those thoughts that directed his fatal, final actions. The outcome now is a smoking hole full of twisted metal and human debris.

Fatalities. Body parts. The terms anesthetize the reality.

The crash site contains what was once an airplane and its occupants, buried in a five-foot crater. A self-made grave for pieces of once-living people with scattered parts of the wreckage for a tombstone.

It is my job to sort through these pieces of metal and flesh and offer my opinion to help determine the cause of the carnage. Officially, the National Transportation Safety Board's (NTSB) investigator determines the "probable cause." My responsibilities are only to deduce if the violation of any Federal Aviation Regulation or a malfunction of our system was a factor in the accident. But when the FAA and NTSB investigators are digging side by side, their "official" capacities tend to overlap.

Body parts. Not clearly defined arms and legs as if they were unbloodied, disconnected limbs from a mannequin stacked neatly for inspection. Body parts are fragments of tissue and bone and fluids smeared on pieces of aluminum and plastic and fabric. A severed hand with blood and gristle for a wrist gripping a broken control wheel. Burnt and charred bones mixed with scorched and melted spars.

And so you look and inspect all these pieces. And then you take a shovel and dig deeper into the grave seeking clues. And you're not sure if that thing is a bone, piece of wood, or airplane part. And you dig some more. You place a lung in a body bag. You wipe away the blood and meat from the face of an instrument, looking for more clues. Yes, the once-living human flesh is now reduced to nothing more than meat. "Hamburger," you tell yourself. You've seen it before. You can deal with that. It lets you go on. Look beyond the hamburger. Try to ignore it. Look only at the instruments.

You quickly learn to form a crust that disengages you from the gruesome reality of the situation.

And when you can dig no more because your shovel strikes something beneath the buried engine that might be a skull that the coroner must examine, you go home. You wash away the disease and stench of the day with a mixture of bleach and water. Your hands may be clean, but there exists no solution to disinfect your mind. And it angers you.

Aviation. That magnificent blend of skill and beauty so recently left behind in the real world. That world that displayed the rapture of second sunsets, starched-white clouds, and the satisfaction of conquering challenges unknown to earth-bound mortals. That world that contained regulations for stretching, bending, and, yes, breaking.

I have just seen the results, the epitome, the ultimate culmination of the lack of safety. It is the desecration of everything I've loved reduced to a pile of broken metal and bones and regulations. Had the pilot not broken the regulations, had he not taken off into weather conditions he was not certificated for....

Aviation Safety Inspectors. Three months ago I did not know what ugliness their title forced them to confront. For them, safety goes beyond those nice little seminars. But they never talked about it. Or perhaps they did, and I did not have the experiences to relate to what they were trying to tell me. I had never realized that the stupid mistakes I had once committed could cause such horrible results. But they knew. I could not appreciate what they had seen.

I no longer question the seriousness that masks their faces when safety is mentioned. They know that too many people have died getting aviation off the ground in the last few decades. From these deaths, these mistakes, regulations have been spawned to prevent further needless deaths. It would be wasteful not to learn from previous sacrifices.

So if you choose to willfully break a regulation, ignore past lessons, and are fortunate enough to survive your mistake, that Aviation Safety Inspector will be very interested in your actions. They must weigh the potential for danger your disregard of the regulations imposed upon yourself and others. They must decide how much of a threat you are to the safety of all who fly, and recommend the necessary corrective actions. And you may be angry with the decisions. But your anger cannot penetrate the crust they have been forced to construct to protect their feelings. These actions are not only for your benefit but for theirs also. They don't want to go to some future smoking hole full of your body parts.

For many people, this year's Thanksgiving will not be a joyous occasion. Because of the actions of one pilot, a family's table will be empty.

For me, I am not looking forward to viewing the turkey's carcass.

✈

Jerry Wyatt is an Aviation Safety Inspector at the West Chicago FSDO at the DuPage Airport (DPA). He has been with the FAA for about eight years now, but his article harks back to his first days on board.

As I first read his words, the hair stood up on the back of my neck, because it sounded like he was talking about me!

Mr. Wyatt has put into words what I am sure is in the hearts of just about everybody who has had the duty of accident investigation. He has graciously allowed me to share these words with you. Thank you, Jerry— Bruce Edsten, Safety Program Manager, Louisville, KY.

A HOLLY, JOLLY TIME ON TANGIER ISLAND

by Kristina Henry

Every year at Christmas time if you are anywhere near Dorchester County on the Eastern Shore of Maryland, you will see, on one particular Saturday morning, a squadron of planes, all shapes and sizes, flying west towards the Chesapeake Bay. This general aviation mission is dubbed the Annual Tangier Island Holly Run. Originally organized by Ed Nabb, Sr. and now a combined effort conducted by him and the Cambridge-Dorchester Airport in Cambridge, Maryland, the Tangier Island Holly Run is a holiday tradition that dates back almost 30 years.

It began in December of 1968 as an impulsive goodwill effort by Ed Nabb, Sr. and his son Ed Nabb, Jr., both avid sailors and aviators, to spread some holiday cheer to the natives of Tangier Island. After picking holly for their own family holiday, Ed and his father packaged some additional holly in plastic bags and carried it over to Tangier Island in their classic 1946 Ercoupe.

Ed Nabb, Sr. then decided to make it an annual event transporting holly to the island and simultaneously bringing

Photos by J. Christian Fenger

together the Eastern Shore mainland with Tangier Island, two entirely different cultures. As the years went by, the event became more renowned, and more and more pilots volunteered to bring bags of holly over to Tangier Island. The success was phenomenal! Twenty-nine years later, depending on the weather, the event draws quite a crowd of pilots and passengers.

Tangier Island is a small island, barely three square miles, located in the heart of the Chesapeake Bay, fourteen miles from Crisfield, Maryland. It was chartered by Captain John Smith in 1607 and first settled by John Crockett, his wife, and four sons in 1686. Today, with a population of approximately 850, it has one school with grades kindergarten through high school. Since there is no established industry on the island, most of the population makes a living from the waters of the Chesapeake Bay. During the War of 1812 it served as a British Naval Base.

Because there are no trees on the island, everything having been cleared for homes, there are also no fresh greens available for holiday decoration. Not only does the Tangier Island Holly Run present pilots with the opportunity to fly, it has also become an annual tradition between the mainland and the natives of Tangier Island. And what better cause is there than to spread good cheer during the holiday season?

Pilots by the dozens fly into Cambridge early on a Saturday morning in December to take part in this annual flying ritual of holiday sharing. At 8:00 AM, the Mayor of Cambridge—currently Mr. David J. Wooten—gives a short speech, both a welcome to all the participants and a little bit of a how-to on the schedule of events for that day. The Cambridge-Dorchester Airport manager, Elvin Thomas, is also present. The full bags of holly are mute spectators to all the speeches, sitting in a small area, awaiting transport to their new destination.

After a preflight briefing, each pilot is given a sticker that says Tangier Island Holly Run. The pilots take a bag (one bag per plane), and the planes line up on the runway. And what a sight it is to behold! A line is formed consisting of up to sixty planes, singles, twins, retractables, occasionally even an amphibious Osprey. Some transport just one pilot, while others carry couples, whole families, or a group of friends.

The takeoff can be a bit prolonged because of the sheer volume of participants, but after the first plane takes off, the line moves quickly, as plane after plane lifts into the air. Like a perfectly staged concert, the Tangier Island Holly Run is well managed and conducted without incident. (The pilots of slower/older/single engine planes are asked to line up at the head of the line to time the flight better.) An Osprey serves as the Holly Run's safety patrol in the event that some of the participants get their feet wet.

The early winter weather is usually cold and crisp, perfect for flying. It is especially pleasant flying over the Bay, where there is little turbulence.

As Ed Nabb, Jr. wrote in his essay, *A Short History of the Tangier Holly Run,* "A 6,000 hour senior will fly side-by-side with a new private pilot and the air frequency is filled with chatter such as 'Holly Two - to Holly Three - extend your down wind so the Santa Express can land ahead of you.' Santa always makes the trip, in a twin, complete with bags of candy canes."

The descent requires a little more skill and takes longer. There is usually a long line on down wind as many pilots near their approach to the island. But, as with the takeoff, the landing is perfectly choreographed. Each plane does the same thing in perfect cadence — descends, circles, and lands. Since there is no tower on the island, pilot awareness is utterly crucial, and, as they say, timing is everything.

As the planes land, they taxi over to a parking area. It takes quite a while for every plane to land, and the parking area becomes very crowded in a short period of time. There are spectators galore and a welcoming committee serving hot chocolate and

cakes in a small house, which serves as the airport terminal.

According to Ed Nabb, Jr., there was a bit of controversy on the first Holly Run. When Ed Nabb, Sr. arrived on Tangier Island with two large bags of holly and gave them to the island's only two churches, there was concern among the churches' elders, since decorating a church with greens could be considered pagan. After the governing boards discussed it, it was decided to accept this holiday gesture. Since that time, the number of airplanes has increased tremendously, as well as the number of states represented.

It's an extraordinary and rare experience that takes place only once a year in a very unique region, where time seems to stand still and a way of life is the same as it was for hundreds of years.

This year's Holly Run will be December 7, 1996, at Cambridge-Dorchester Airport. For more information, please call Elvin Thomas, Cambridge-Dorchester Airport Manager, at (410) 228-2920. Tangier Island can be found on the Washington sectional 43 miles SW of Cambridge, Maryland (CGE).

NIGHT FLYING AND HOW TO AVOID

After reading some accident statistics about some of the leading causes of crashes, we think two causes that are appropriate to discuss and review during this time of year are the increased risk of night flying and the increased risk of controlled flight into terrain (CFIT) during night flying.

The dangers of night flight are well known. No, we are not saying that flying at night is any different in terms of aircraft performance than flying during the day, although night flight might be smoother because of the lack of convective thermal activity. Frankly, the aircraft doesn't care if it is flying with or without benefit of sunlight, unless you consider the possible benefit of a lower density altitude because of the normally lower temperatures at night. No, the risks of night flight are not aircraft related. The risks are people related.

The problem is two-fold. One is the increased risk that a night, off-airport landing poses. Simply stated, in the event of an off-airport precautionary landing there is a greater chance of injury at night because it is more difficult to find a good landing site in the dark. It is hard to land safely where you can't see the rocks and the trees. That problem is summed up in the old story about night emergency off-airport landings, "If you can't see at night, turn on your landing light. If you don't like what you see, turn it off." Such is the risk of an off-airport landing at night.

The other problem may be the greater risk. The human being flying the aircraft is a daytime creature. Humans are not designed to function well at night. For one thing, our night vision is poorer than our day vision, plus it is subject to various nighttime induced illusions. Humans are also more active during daylight hours which means we like to sleep when it is dark. Adding to the natural physical limitations that humans have at night, humans also suffer an even more serious problem as the 21st Century looms on the horizon: CLOCK-I-TIS.

Or more precisely, our fascination and commitment to managing our lives by the clock. The problem is that our religious-like dedication to the clock controls us to the point where we can become a safety risk. Our desire to get home on time at all costs is one example. Another example is the fact that many general aviation (GA) pilots flying at night are not professional pilots with duty and rest requirements and limitations.

We are not saying GA pilots are not good pilots. We are saying that in many cases, GA pilots flying themselves at night have worked a long, full workday and are flying either to return home after a business trip, or they are flying for personal reasons such as maintaining their night currency after a 10 to 15 hour or longer workday.

The problems posed by suchl pilots flying at night are similar to the problems of other workers who work long hours at night, such as police officers, truck drivers, and shift workers.

The word is Fatigue with a capital F.

The pilot is fatigued after being awake for 15 to 18 or more hours over one or possibly several days during an extended business trip. With fatigue comes the chance that the pilot is not as sharp as possible. Pilot judgement may suffer. The pilot's reflexes are slowed. The pilot's night vision is not as good as during the day. And the pilot's need for oxygen at lower altitudes increases. These and other such physiological factors may combine to cause an accident that might not have happened during the day.

So what can be done to combat potential night related accidents?

The first is to realize there is a greater risk when flying at night. That risk becomes even greater during the winter months when the hours of darkness are longer and the survival dangers posed by winter conditions are greater.

In our opinion, the solo pilot flying at night without passengers is at the greatest risk because if the pilot is fatigued or bored, there is a greater danger of the pilot falling asleep en route. There have been accidents where it is speculated that the pilot was flying on autopilot, fell asleep, and while asleep overflew the intended point of landing and the aircraft crashed when it ran out of fuel. If not true, how else can you explain why a healthy pilot flying a good aircraft crashes after a long work day along an extended line drawn from the departure point through the point of intended landing?

Another survival safety technique at night is having someone else onboard who can help keep you awake and keep the flight interesting.

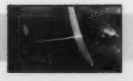
Another is to simply not fly at night if you are tired.

Another is to raise your own personal safety minimums at night such as higher weather requirements and more fuel. Again, if you don't feel safe and sharp, don't fly.

Another is to schedule night proficiency flying on a non-workday so you can get a good night's sleep the night before and you have all day to get to the airport. Besides, preflight inspections are much easier done in daylight.

The final thought is to remember, for logging purposes, night flight is that time between official sunset and sunrise. For FAA currency purposes though, to be pilot in command (PIC) of an aircraft carrying passengers during the period one hour after official sunset until one hour before official sunrise, a pilot must have made at least three takeoffs and landings to a full stop in the category and class of aircraft to be used during that period within the last 90 days. (FAR §61.57(d))

The following story illustrates some of the problems of flying at night. Re-



cently a pilot told us about a night flight he once made in Montana where he mistook the sun rising under a layer of clouds for the lights of a distant town. After adjusting his heading to fly toward the "lights" on the horizon, he finally realized it was the sun being diffused by clouds rather than lights from the town.

He said several factors contributed to his mistake. He was tired because he was returning from a charter flight where he had to spend several hours on the ground between the outbound and inbound portions of the flight. Another factor was there were only a few towns along his flight path separated by miles of darkness with nothing in between. So it was natural for him to think the light on the horizon was a small town he knew was in that general direction. Adding to the illusion was the fact the sun was rising through a cloud layer that hid the sun's classic silhouette. Finally, his awareness increased to the point where he realized his instruments were in fact indicating he really was off-course, and he finally recognized the sun's shape as it slowly became more visible.

He realized his error and corrected his course. Fortunately, this story has a happy ending. But suppose there had been a mountain or obstacle along the off-course route, would the tired pilot have realized his mistake in enough time to avoid a CFIT accident? We will never know, but we wonder if pilots have crashed in similar circumstances.

Night flying accidents are not unique to GA pilots. A major TV network made a movie about a Canadian military crew that canceled their IFR flight plan and its inherent air traffic control protection to make a night VFR descent and landing at a remote airbase in the far north on a dark winter night. The crew descended into a black hole and hit a mountain top hidden by the darkness. The error the crew made was in not using all available flight aids instead of their eyes.

As said earlier, the human eye is not that good at night. The AIM says the human pilot is subject to many problems in flight that can be deadly. For example, Paragraph 8-1-5 says illusions rank among the most common factors contributing to fatal accidents. The AIM says the following illusions can cause spatial disorientation: The Leans, Coriolis Illusion, Graveyard Spin, Graveyard Spiral, Somatogravic Illusion, Inversion Illusion, Elevator Illusion, False Horizon, and Autokinesis.

The AIM also says the following illusions can lead to landing errors: Runway Width Illusion, Runway and Terrain Slope Illusion, Featureless Terrain Illusions, Atmospheric Illusions, and Ground Lighting Illusions.

If you don't remember what these terms mean, please see the Illusion Quiz on Page 12.

The AIM also discusses the problems of reading flight charts at night or in dim light, night vision adaptation, the problem with night vision adaptation above 5,000-foot cabin pressure, the effects of carbon monoxide from smoking and exhaust gasses, and the problem of the lack of Vitamin A in your diet and its effect on your night vision adaptation.

The best defenses against many of the illusions listed include being aware they exist and to be prepared for them; having and using an instrument rating; checking and using all available data on your route of flight and airport of intended landing; having VFR charts available when flying IFR to visualize the terrain and airport information better; and using all available pilot aids such as runway approach lights, visual approach slope indicators such as VASI, airport runway lighting, and any other available landing services such asl radar services.

One of the best defenses against many of the landing illusions is in every aircraft cockpit. Your altimeter is one of your best landing instruments both during the day and at night. As long as it is properly set and used, it will give you your height above sea level regardless of terrain or airport illusions. As long as you know the airport's elevation and surrounding terrain, you can compute the altitude you need for a standard approach. As long as you keep your cockpit right side up and your height above any objects equal to or greater than the minimums, you should not have any problems flying at night provided you keep alert and awake and don't run out of fuel. The key to staying out of the trees is keeping alert. Always remember, it is the mountain you don't see that will probably kill you at night. So be aware of your altitude, keep your situational awareness and know exactly where you are, avoid flying into terrain, and always land on the first third of the runway.

Have a safe winter of night flying.

CALLING ALL NORTHERN CALIFORNIA PILOTS

Stanford University has received funding from the National Institutes of Health to conduct a study of the interaction of aging and pilot performance, with an emphasis on general aviation. Volunteers will be periodically evaluated in a general aviation simulator by Stanford over the course of a four-year period. They are looking for volunteers in the age group 50 to 67. Women and minority volunteers are especially encouraged to consider the project. For information, please call Nancy Dolhert at 415-852-3457.

ILLUSIONS IN FLIGHT

Match the terms with their definitions.

Spatial Disorientation

Terms

A. Coriolis illusion
B. Graveyard spiral
C. Inversion illusion
D. False horizon
E. Elevator illusion
F. Graveyard spin
G. Autokinesis
H. The leans
I. Somatogravic illusion

Definitions

☐ 1. An abrupt correction of a banked attitude, which has been entered too slowly to stimulate the motion sensing system in the inner ear, can create the illusion of banking in the opposite direction. The disoriented pilot will roll the aircraft back into its original dangerous attitude, or if level flight is maintained, will feel compelled to lean in the perceived vertical plane until this illusion subsides.

☐ 2. An abrupt head movement in a prolonged constant-rate turn that has ceased stimulating the motion sensing system can create the illusion of rotation or movement in an entirely different axis. The disoriented pilot will maneuver the aircraft into a dangerous attitude in an attempt to stop rotation. This most overwhelming of all illusions in flight may be prevented by not making sudden, extreme head movements, particularly while making prolonged constant-rate turns under IFR conditions.

☐ 3. A proper recovery from a spin that has ceased stimulating the motion sensing system can create the illusion of spinning in the opposite direction. The disoriented pilot will return the aircraft to its original spin.

☐ 4. An observed loss of altitude during a coordinated constant-rate turn that has ceased stimulating the motion sensing system can create the illusion of being in a descent with the wings level. The disoriented pilot will pull back on the controls, tightening the spiral and increasing the loss of altitude.

☐ 5. A rapid acceleration during takeoff can create the illusion of being in a nose up attitude. The disoriented pilot will push the aircraft into a nose low, or dive attitude. A rapid deceleration by a quick reduction of the throttles can have the opposite effect, with the disoriented pilot pulling the aircraft into a nose up, or stall, attitude.

☐ 6. An abrupt change from climb to straight and level flight can create the illusion of tumbling backwards. The disoriented pilot will push the aircraft abruptly into a nose low attitude, possibly intensifying this illusion.

☐ 7. An abrupt upward vertical acceleration, usually by an updraft, can create the illusion of being in a climb. The disoriented pilot will push the aircraft into a nose low attitude. An abrupt downward vertical acceleration, usually by a downdraft, has the opposite effect, with the disoriented pilot pulling the aircraft into a nose up attitude.

☐ 8. Sloping cloud formations, an obscured horizon, a dark scene spread with ground lights and stars, and certain geometric patterns of ground light can create illusions of not being aligned correctly with the actual horizon. The disoriented pilot will place the aircraft in a dangerous attitude.

☐ 9. In the dark, a static light will appear to move about when stared at for many seconds. The disoriented pilot will lose control of the aircraft in attempting to align it with the light.

Landing Errors

Terms

A. Runway and terrain slope illusion:
B. Atmospheric illusions:
C. Runway width illusion:
D. Ground lighting illusions:
E. Featureless terrain illusion:

Definitions

☐ 1. A narrower-than-usual runway can create the illusion that the aircraft is at a higher altitude than it actually is. The pilot who does not recognize this illusion will fly a lower approach, with the risk of striking objects along the approach path or landing short. A wider-than-usual runway can have the opposite effect, with the risk of leveling out high and landing hard or overshooting the runway.

☐ 2. An upsloping runway, upsloping terrain, or both, can create the illusion that the aircraft is at a higher altitude than it actually is. The pilot who does not recognize this illusion will fly a lower approach. A downsloping runway, downsloping approach terrain, or both, can the opposite effect.

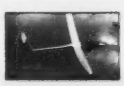
☐ 3. An absence of ground features, as when landing over water, darkened areas, and terrain made featureless by snow, can create the illusion that the aircraft is at a higher altitude than it actually is. The pilot who does not recognize this illusion will fly a lower approach.

☐ 4. Rain on the windscreen can create the illusion of greater height, and atmospheric haze the illusion of being at a greater distance from the runway. The pilot who does not recognize these illusions will fly a lower approach. Penetration of fog can create the illusion of pitching up. The pilot who does not recognize this illusion will steepen the approach, often quite abruptly.

☐ 5. Lights along a straight path, such as a road, and even lights on moving trains can be mistaken for runway and approach lights. Bright runway and approach lighting systems, especially where few lights illuminate the surrounding terrain, may create the illusion of less distance to the runway. The pilot who does not recognize this illusion will fly a higher approach. Conversely, the pilot overflying terrain which has few lights to provide height cues may make a lower than normal approach.

QUIZ ANSWERS

Spacial disorientation answers - 1-H, 2-A, 3-F, 4-B, 5-I, 6-C,7 E, 9-G
Landing errors answers: 1-C, 2-A, 3-E, 4-B, 5-D



HOLIDAYS MEAN CAREFUL PLANNING

by Phyllis-Anne Duncan

Oh, sure, you've got your list, you've checked it twice, and you've probably finished your holiday shopping. Now, you're getting ready to pack that oversized suitcase or parachute bag with all your gayly wrapped presents, which your chosen airline will carry as checked baggage when you head back to the homestead for the holidays. And those fragile items? Well, the airline says only two carry-ons, but they don't count large purses and backpacks, do they? Besides, it's the holiday season; they'll lighten up on those carry-on restrictions. They want little Matthew or Jane to get your carefully selected gifts, right?

There are a couple of things wrong here. First, don't wrap your presents until after you arrive at your destination. Why? Remember, more bags are going to be hand-searched, and airport security personnel (who are only doing their jobs assuring our safety) will not be deterred by pretty wrapping paper and elaborate bows. If they can't determine by x-ray the contents of a package they can and will open it to be sure, and they won't be so careful as you in re-wrapping it. You could save yourself a lot of time and elevated blood pressure if you plan on buying wrapping paper and all the sundries needed after arriving at your destination.

Second, with heightened security in effect and the increase in travelers during the holiday season, the airline will be more strict about the number of carry-ons allowed. Remember, too, that carry-ons may now be subject to a hand-search. Not only you but the person behind you is going to be inconvenienced while waiting for security to search your purse, your tote bag, your backpack, and your crew-sized suitcase on wheels. Airlines are now responding to passenger complaints about a seeming laxity on enforcing the two carry-on requirement. All those bags test some peoples' patience while they eagerly wait disembarking. (I'm sure you've seen the rolled eyes and heard the impatient sighs.)

Last holiday season, FAA published some tips to help passengers minimize delays; unfortunately, the news release didn't reach us until after our holiday issue had gone to press. So, we offer them now for this season. (You might also want to refer to both the September and October issues of *FAA Aviation News* concerning changes to hazardous materials carriage and more stringent security measures. If you do not have copies, please call (202) 267-8017 and request them.)

Do not leave vehicles unattended at curbside. It's tempting to switch the flashers on while you go in and check baggage so you don't have to drag countless bags from satellite parking. But in these days of high security, a vacant vehicle at curbside at an airport is suspicious and rightly so, considering bombs inside vehicles were responsible for the carnage at Oklahoma City and in Saudi Arabia. If you're traveling alone, see if you can't get a friend or relative to drive you to the airport and help with the baggage. That's easier than trying to get your towed car out of the impound lot and still make your flight. Public transportation is an option for many, and a friend can still take the bus or subway with you and lend a hand.

Keep your identification handy. Remember the story I told last issue about a woman who left her drivers' license at home? The airline wouldn't let her on the flight until she went home and returned with a picture ID—a four-hour round trip drive. If you do not have a photo id, make sure you have two pieces of identification, one of which must be from a governmental authorithy. I'm lucky in that I have an FAA ID in addition to my driver's license, and I always have one or the other in my purse at all times. But that doesn't stop me from doubling checking my purse before I head out the door to drive to the airport. Also be prepared to answer those questions about who packed your bags and whether you left them unattended, etc.

Keep an eye on your own bags, but watch out for unattended items as well. Recently, during taxi to takeoff an eagle-eyed airline passenger spotted a briefcase another passenger on a previous flight had left under the seat. The plane had to taxi to a remote area of the field, all the passengers were evacuated, and the suspect briefcase was removed. It proved not to be anything sinister, but many people missed connecting flights and were delayed because of the necessary evacuation.

In today's world, assuming that the owner of a suitcase or other package left unattended will return shortly may be too dangerous. If you spot something along those lines, DON'T approach it or touch it yourself. Bring it to an airline or airport employee's attention; they have been trained in what to do.

Place any metal objects in your checked baggage. This will save constant trips through the metal detector or a possible frisking. Remember that you may be asked to turn on tape players or computers to verify they are what they seem.

Leave firearms at home. This seems like an obvious caution, but recently several celebrities have been stopped at screening stations with loaded firearms in their carry-on luggage! The security guard doesn't care if you forgot it was there. Besides, you could be subject to a civil penalty or arrest if you attempt to board an aircraft with a gun, and neither of those make for a happy holiday season. If you need to transport a gun, e.g., a gift for someone, it must be placed in checked baggage, unloaded, and declared to the ticket agent when you check in. Some airlines have more strict requirements, so call your airline well in advance of showing up at the airport.

Arrive early. I can't emphasize this enough. I've always been an early arriver, maybe because I have this fear of missing my plane. (Funny, that doesn't happen in general aviation. Hmmm?) Some travelers will have to make a big adjustment in this area, and it will be difficult for some. But we humans learn pretty quickly for the most part; it would probably take only one or two missed flights to achieve that paradigm shift. Holiday travel has always meant more delays than usual, but this year with added security measures in effect, it may not be unrealistic to arrive two to three hours before your flight. So, you sit in the airport for a couple of hours? Some now have great shopping malls and bookstores, not to mention restaurants. Besides, people-watching is great fun, especially at holiday time.

Don't carry or pack hazardous materials. The regulations on carriage of hazardous materials are in flux right now, and if you're not sure about what you can and can't carry, refer to those back issues we mentioned earlier, or contact the airline. If they can't give you detailed enough answers, you could contact your local FAA Flight Standards District Office, which can refer you to the nearest FAA Civil Aviation Security office.

Air travel is the safest means of transportation anytime, but during the holidays, when family get-togethers are so important, flying is really the way to go and get there safely and efficiently. Have a little patience at the airport, watch what you pack and how much you pack, bear in mind that people are just doing their jobs to keep us all safe, and have a joyful time during this holiday season.

Illustration by Bill Ballou

A Dark and Icy Night

by Patricia Mattison

"There is no cause for concern, Martha. The sleigh is fully operational this year." For the first time ever Santa was getting a little bit peeved with his wife.

"Just look outside. There's a storm gathering," his loving wife proclaimed in a nervous voice, "and I'm worried."

"Remember, dear, that I have magical powers and can ward off the weather if I have to," Santa replied, adding, "I hope," under his breath.

Even Santa had experienced moments of excitement over the centuries. He remembered the past few years. The instrument conditions he'd encountered, the turbulence, and the time he had to get the sleigh ready at the last moment. And now weather was approaching. What next?

"I certainly hope the children of the world appreciate the hard work it takes to get their gifts under the tree," mumbled Santa as he looked at the weather report on his computer. The weather depiction chart he had in front of him was not all that bad for the most part. Except for the storm approaching the North Pole from Siberia, things looked fair to middling. A few scattered cloudy areas dotted the map in front of him. The freezing level was low. As a matter of fact, it was on the surface at the Pole but was higher across the rest of the world. Santa's planned route of flight took him into areas of possible snow and rain, where the freezing level was at or close to the surface. He felt that if he flew well above or well below the freezing level he would be fine.

Santa waited until just before his planned departure to call Flight Service and get a weather update. After satisfying himself that there was no significant weather to interrupt his journey, he filed a flight plan, thanked the flight service specialist, and, wishing him a Merry Christmas, hung up the phone.

"You see, Martha," said Santa, "Flight Service says that there is no adverse weather enroute, only the front that will be coming in. The rest of the route should not be a problem. The sleigh is instrument equipped, and I am current. We're ready to go."

Martha was not at all sure that Santa would be able to avoid weather, but, trusting his judgement, she hugged and kissed him goodbye as he climbed into the seat of the fully loaded sleigh. "Be very careful tonight, Nicholas," she whispered, "I want you home safe and sound."

Santa cracked the whip over the heads of his faithful reindeer, launching the sleigh into the air. Glad to be off, Santa thought as he let his mind wander to the job ahead. So many children to deliver to, and more coming each year. The sleigh was really loaded and, as a result, was a little sluggish in its response to added pull from the reindeer.

Approaching Saskatoon, Saskatchewan a light misty rain began to fall. By the time Santa was over Minot, North Dakota it was raining, hard. Santa had left presents all along the way but still had an almost full load in the back of the sleigh. It was really pouring freezing rain now and ice was forming on the reindeer's antlers. Rudolph had a rather large icicle hanging off his nose, dimming his navigation light.

Santa called upon his faithful reindeer to pull even harder, but try as they might the sleigh continued to descend. Lower and lower the sleigh went into the black of night. Santa shouted, "On Dancer, on Prancer! Pull harder boys or we'll crash for sure!" Seeing a clear spot below, Santa decided that even though the time was short for delivering the gifts, the best place for him and his sleigh was right down there on the ground. Guiding the reindeer to what appeared to be a flat snow covered area, Santa made a less than perfect landing with the ice covered sleigh. During the approach the controls felt very heavy and the sleigh did not respond well at all, but they were down and safe, and that was what mattered most.

It was still raining hours later. The air seemed to become warmer, the ice was melting off the sleigh, and Rudolph's nose once again was a bright shiny red. "I think that I'll chance taking off again. I'd better get busy with my route or Martha will commence to worry," Santa thought. A flick of the whip and off they flew. This time the controls responded as they should. His reindeer pulled the sleigh smoothly through the night sky.

It was almost dawn when Santa delivered the last gift. "These trips are getting longer and longer. Before too long there will have to be two Christmas Eves to get all the gifts delivered. HO, HO, HO!" Thinking that to be a great joke, Santa was still laughing as he disappeared out of sight on his way home to his sweet Martha.

Ms. Mattison is the Safety Program Manager in Juneau, Alaska.

THE PAPER AND INK USED IN THE ORIGINAL PUBLICATION MAY AFFECT THE QUALITY OF THE MICROFORM EDITION

THE WET PAPER BAG OF RESPONSIBILITY

by Bill O'Brien

In the past 10 years as one of FAA's minor "talking heads," it has been my job to explain and defend the FAR pertaining to aircraft maintenance at over 400 safety presentations attended by pilots and mechanics.

At meetings attended by both mechanics and pilots, the second most asked question—right after "What's happening in Washington?"—has been, "Who is responsible for the airworthiness of an aircraft?"

Is it the pilot?

The owner?

The mechanic?

Who has to ensure that the aircraft is airworthy?

At a recent meeting, one rather large, grizzled mechanic stood up. His huge, tree-sized arms indicated he could bench press a Harley, not to mention one slightly middle-aged Fed. He smiled sweetly at me—adding to my apprehension—and put the same question to me in a much more memorable way:

"Hey, Mr. Fed, who gets to hold the wet paper bag of responsibility?"

Gathering my waning courage, I replied, "Actually, all three individuals get to hold the wet paper bag of responsibility."

After a pregnant pause, the mechanic—who had remained standing to absorb my sage advice—squinted as if to put me in some imaginary gunsight and said, "Your answer was a perfect Washington, DC reply."

"How so?" I responded, falling headfirst into his trap.

"Your answer was probably 100% right, but it's also 100% useless," was his devastating reply. Actually, the word he used wasn't exactly "useless," but this is a government magazine.

The crowd laughed, the mechanic's smile got even bigger, and my ears turned red. "Okay, okay," I said, hoping to quell the riot or at least the amount of enjoyment the crowd was having at my expense. "Will you please give me a chance to defend my answer?"

A series of nods from the audience gave me the encouragement to try to make my point. I even got a nod from the mechanic as he decided to sit while enjoying my discomfort.

"Okay," I began, taking the high road, "before we go any further, we need a bench mark, a standard that we can all agree to. The best way I have found to reach this standard is to agree on the definition of the term 'airworthy.'"

I glanced around, and no one was forthcoming; obviously, this was all up to me. "You would think," I continued, "that such an important and fundamental aviation term would be defined in FAR Part 1, 'Definitions and Abbreviation.' However, this is not the case. But in the last 40+ years of NTSB case law and civil court decisions generally agree that the term 'airworthy' means that an aircraft or one of its component parts meets its approved type design or properly altered condition and is in a condition for safe operation. Would you agree?"

Seeing no outright opposition, I asked the audience if we could agree that this definition of "airworthy" or "air-

worthiness" would be the standard which all three individuals—the pilot, the owner/operator, and the mechanic—must meet. The crowd's response was not what one would call overly enthusiastic, but at least it was not hostile, so I pressed on.

Let's Talk About the Owner/Operator's Responsibility

Falling easily into my bureaucratic mode, I said, "Title 14, part 91 section 91.409, subparagraph (a) generally states that the owner or operator of an aircraft is primarily responsible for maintaining that aircraft in an airworthy condition.

"This includes compliance with FAR Part 39 (Airworthiness Directives). To comply with these rules it means that the owner/operator must have the aircraft inspected, have all applicable AD performed, and have all life-limited parts called out on the aircraft, engine, or propeller type certificates changed when required."

The crowd's eyes were beginning to glaze over, but I was not quite done with the owner/operator yet. Taking in a gulp of air, I went on, "In addition, section 91.404—'Maintenance Required'—states that the owner/operator must ensure that any discrepancies not addressed by an approved minimum equipment list or in accordance with section 91.213—'Inoperative Instruments and Equipment'—must be fixed between inspections. In subparagraph (b) of section 91.405, the rule requires the owner/operator to ensure that maintenance personnel make the appropriate entries in the aircraft's logbooks."

Another deep breath, and "Under section 91.417—'Maintenance Records'—the owner/operator must comply with two sets of maintenance record keeping requirements. Subparagraph (a) requires the owner/operator to have available for FAA inspection the records of the last 100-hour or annual inspection or approved inspection and any other maintenance, preventive maintenance, and alteration that happens in the last year.

"The second requirement of section 91.417 is to keep the following records until the aircraft is sold or destroyed: total time in service of the airframe, each engine, and each propeller; the current status of life-limited parts; time since overhaul on all parts requiring overhaul; current status of AD; current status of inspections, copies of FAA Form 337 for all major alterations performed..." I could tell how many in the audience owned airplanes by the less-than-happy looks I was getting. I decided a change of subject was due.

Now Let's go over the Pilot's Responsibility

I took a sip of water, cleared my throat, and began anew, "Section 91.7—'Civil Aircraft Airworthiness'—is pretty clear when it states that the determination of whether or not an aircraft is airworthy before flight is the primary responsibility of the pilot in command. Section 91.103 requires the PIC to become familiar with all available information concerning the flight, this includes weight and balance, takeoff and landing performance data, just to name a few.

"The pilot's responsibility to determine airworthiness of the aircraft continues during the flight and only ends after the aircraft is tied down or put in the hangar after the flight."

Short, sweet, and to the point. The crowd continued to stare, so...

Last, but not Least, the Mechanic's Responsibility

I warned them, "To explain a mechanic's responsibility under the FAA will take a bit of doing." The audience seemed willing even though I had the feeling I was about to fall into an open grave. I pressed on, good soldier that I am.

I began, "The length of time a mechanic is held responsible for airworthiness of the aircraft depends on whether or not the mechanic has performed either an inspection or performed maintenance.

"If a mechanic has performed a 100-hour inspection and signed it off in the aircraft's logbooks in accordance with section 43.11, that mechanic is held responsible for the airworthiness of the aircraft until the ink of his or her signature has dried."

On hearing that, all the mechanics in the audience smiled, but most of the pilots had veins protruding in their foreheads while their faces turned interesting shades of red and purple. To me this was a clear indication that they were now starting to exceed the manifold pressure limits of their pulmonary systems. I asked the pilots to reduce power and calm down long enough for me to explain my answer.

"Okay," I said, catching a breath and looking at a lot of still-red faces. "When a mechanic signs off a 100-hour inspection or an IA signs off an annual, that mechanic is certifying that the aircraft is airworthy at that moment in time.

"Once the aircraft leaves the maintenance hangar, the mechanic no longer has control over the status of the aircraft. So, the FAA cannot hold a mechanic responsible for the airworthiness of an aircraft that is no longer in his or her care."

Almost immediately, a very young, obviously brand new pilot stood up to confront me.

You can always tell a brand new pilot because they are driven by a primal mating gene that causes them to buy a five-pound aviator watch which is the same size and weight and has the same complexity of a naval observatory telescope.

These very expensive aviator chronometers have about 10 or so dials on the face. A new pilot can impress his or her friends by matching up the dials, circular slide rule, and internal digital computer in accordance with the instruction booklet that was crudely translated from some foreign language, and the chronometer can tell you that the next solar eclipse is due in the year 2033. The downside is that the dials are so small you can't read them as you sit in a vibrating Cessna 150 cockpit.

But that is not the real reason young men buy expensive watches that say "aviation." The real reason

they shell out $500 to $1,000 is so they can impress women with the fact that with 55 hours in their logbooks they have mastered the mystery of flight and are now a pilot and, therefore, an alpha male.

I know about these things because I keep my old, expensive aviator watch with the cracked bezel in my desk, out of sight from my wife and children, in a box labeled, "Stupid things I have Done." (By the way, our lady editor says from first-hand knowledge that many women pilots buy those big watches, too.)

But, I digress. Where was I? Oh yes, my young pilot friend stood there facing me. He cast a suspicious look at my grizzled mechanic, who was still smiling sweetly, and, centering his 20/20 gaze on me, in a cold voice that belied his tender years, he said, "If a mechanic does a 100 or annual inspection, then what does the FAA hold the mechanic responsible for, Mr. FAA?"

By now, I was wishing I'd followed my father's advice and selected some other line of work, but I answered, "While the FAA does not hold the mechanic responsible for anything that happens in the future after a 100 or annual inspection, we do hold him or her responsible for any repair, alteration, service bulletin, AD, or maintenance that was done—back to the date on the aircraft's airworthiness certificate. The amount of time the mechanic is held responsible for that work may be six months, or six years, or 60 years. What I'm saying is, a mechanic's responsibility, when he or she signs off a 100-hour or an annual, buys the past, not the future."

The young pilot was sharp and not to be denied his pint of bureaucratic blood and/or pound of government flesh. "Okay, Mr. FAA," he said, "for the time being I can buy the part about a mechanic signing off an inspection and being responsible only until the ink dries in the logbook, but what about when a mechanic makes a repair or alteration to the aircraft not as a result of an inspection? More 'dried ink?'"

"No," I replied, feeling alone in a crowd, "a mechanic who performs work on an aircraft other than an inspection is responsible for that repair or alteration until that work is inspection, replaced, altered, or removed. About the longest time a mechanic is held responsible for work performed on a general aviation aircraft is approximately a year, that is, when the next annual is due."

I decided to summarize at this point before young pilot could bleed me dry. "What do we have here? We have three individuals, one standard, and different lengths of time each one is held responsible for the airworthiness of an aircraft.

"The aircraft owner or operator is the 'lucky' one because he or she gets to hold that wet paper bag of responsibility longer. The owner/operator is primarily responsible for the airworthiness of the aircraft. However, even though the pilot and the mechanic who worked on the aircraft get to hold the wet paper bag for a shorter time, the standard, or the 'airworthiness,' of the aircraft is exactly the same. So, we have, in effect, a concept of 'shared responsibility' among the owner/operator, the pilot, and the mechanic."

When I finished, I looked out over my now perplexed audience, each one now holding an imaginary, wet paper bag of responsibility, and I bade them a fond thank you and good-bye. As I stepped down from the podium, I remembered what a famous public speaker said about applause. He said, "If you are applauded before you speak, it is an act of faith on the part of the audience. When the applause is given at the end of a speech, it is an act of charity." If I ever get the opportunity to ask him a question, I'll ask him, "What does no applause mean?"

Obviously, Bill, it meant they were so moved by your words they were paralyzed. Mr. O'Brien, good son of the Old Sod that he is, is the FAA's National Program Manager for Airworthiness in FAA Headquarters in Washington, DC.

DARYL J. SCHUELER
1961 - 1996

It seems that 1996 was particularly bad in the sense that we lost some of the top names in aviation, either by accident or natural causes. FAA was not immune to such losses. We lost one particularly bright star who had been with us only a short time. Daryl J. Schueler was an aerospace engineer who worked with FAA's Office of Aircraft Certification, whose employees are the test pilots and engineers for new or modified aircraft seeking FAA certification or supplemental type certification (STC). In April 1996 in Buffalo, MO Daryl and an FAA test pilot were flight testing a modified Piper *Pawnee* for a dual-seat STC and to determine airspeed calibrations at maximum gross weight. The two FAA employees were on board with seven 80-pound bags of dry concrete as ballast. The aircraft took off normally but crashed shortly afterwards, and Daryl was killed on impact. His pilot was seriously injured.

Daryl had had a successful career as an aerospace engineer with Kohlman Systems Research of Lawrence, KS, but had heard the call to public service in July of 1995 when he joined the FAA's Wichita Aircraft Certification Office. It takes a special person with a dedication to the safety of flight to climb on board an aircraft and be a test pilot or test engineer. They can be your neighbors, like Daryl, who was simply raising a young family of two daughters with his wife, Sindey. Testing the parameters of new aircraft was all in a day's work for Daryl.

Last year, major crashes made national headlines, but Daryl's contributions to aviation safety were noted only in several small-town newspapers. His memory and his family deserve more. The aviation industry needs to know about how even FAA employees like Daryl Schueler make the ultimate sacrifice for safety.

Daryl is also survived by his parents, William and Gloria Schueler, a brother Eric, and his grandmother Lillian.

WATCH OUT FOR RUDOLPH!

by Sandy Wright

He may be trespassing on your airport

While deer/car collisions are common in the United States, many people are unaware that a number of deer/plane strikes also take place. Since 1983 there have been 245 deer-related accidents reported, most of which resulted in serious damage to the aircraft. The actual number of accidents is probably much higher than this because many accidents are not reported. The data for this article was taken from two sources, the FAA Bird Strike Database and the National Transportation Safety Board (NTSB) Aviation Accident Database. The first relies on voluntary reporting of strikes by pilots and other aviation personnel; the second is information collected during investigations of accidents or incidents involving civil aircraft by the NTSB.

We know that many strikes with wildlife are not reported for various reasons and estimate that 80% of these strikes may be unreported. Until the FAA Bird Strike Reporting Form 5200-7 was changed to include other wildlife, only bird strikes were reported, leaving us with an incomplete picture for deer strikes in the years before 1990.

Deer and other wild ungulates (hoofed mammals) inhabit all 50 states. Species include the white-tailed deer, mule deer, moose, and elk. The white-tailed deer, which is primarily an eastern species, has been the most commonly struck ungulate. An adult white-tailed deer weighs anywhere from 100 pounds to a record 511 pounds, with an average weight of around 125 pounds. Deer run at speeds up to 36 mph. Although deer prefer to crawl under fences, if disturbed, they will easily jump a seven-foot fence from a standstill or an eight-foot fence with a running start.

Deer often travel in family groups of does and fawns. Males generally stay to themselves and only associate with females during the fall breeding season, also known as the rut. In much of North America the rut peaks in November. In southern states, which have a longer growing season, deer breed over a longer period of time.

DEER ARE INCREASING

There has been a dramatic increase in the deer population in the United States in recent years. At the turn of the century, deer had almost been hunted to extinction with only about 100,000 remaining, but they now number about 24 million.

Airports often are situated in outlying areas and are frequently surrounded by good deer habitat. Land-

ing fields provide prime locations for grazing because they are planted with grasses and other plants that attract deer. Deer, in and around airports, should be a concern for pilots and airport managers because 83% of aircraft-mammal strikes are caused by deer.

FEMALES ON THEIR MIND

The worst month for deer-related incidents is November when the deer are on the move because of the rutting season. Young males are being chased off by adult bucks who are also busy courting does. These distractions are believed to be the reason that one-fourth of all deer accidents occur at this time.

WORST TIME TO FLY

Deer are most active in the twilight hours and at night when they feed. That is not to say that you won't see deer during the day, just that they are usually resting at this time. As you might guess, deer strikes with aircraft occur most often at dusk (47 strikes per hour) and at night (11 strikes per hour) when deer are most difficult to see. For example, one unfortunate pilot noticed a vague shape off the right side of the aircraft during take-off on a dark night. He continued down the runway until his Piper PA-32R collided with an 180-pound deer.

Another pilot reported that a deer ran in front of his Cessna 172 during the flare for a night landing. The prop hit and killed the deer and the nose gear and bottom of the engine compartment were damaged. After the collision, the pilot smelled fuel fumes. When the front of the plane started sliding on the runway, a fire developed which destroyed the aircraft.

It was dusk when a Cessna 421 struck two deer. Although the pilot was not injured, the plane received substantial damage. The landing gear strut collapsed causing both props to hit the runway. The Cessna came to a stop on its main landing gear and the bottom of the fuselage just aft of the nose. The airport was closed for two and a half hours to clear the runway.

ACCIDENTS WHILE AVOIDING DEER

Some accidents were caused, not by actually hitting the deer, but by the pilot trying to avoid deer on the runway. These accidents occurred most often during the day (47%) when the pilot was able to see the deer but still resulted in 89% of the aircraft involved sustaining some degree of damage.

Extent of Damage	Damage caused by striking deer		Damage caused by avoiding deer	
	No. of incidents	% of incidents	No. of incidents	% of incidents
Destroyed	4	2	2	6
Substantial	83	40	29	81
Minor	74	35	1	3
Unknown damage	9	4	1	3
None	32	15	3	8
Unknown	7	3	0	0
TOTAL	209		36	

Table 1. Type of damage to aircraft

Year*	No. of reported strikes	% of strikes
1983	4	2
1984	3	1
1985	3	1
1986	8	4
1987	4	2
1988	2	1
1989	0	0
1990	10	5
1991	21	10
1992	30	14
1993	28	14
1994	52	25
1995	32	15
1996**	12	6
TOTAL	209	

*Deer strikes before 1990 were not reported to FAA on Form 5200-7

**1996 includes only January through August

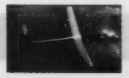
Table 2. Number of aircraft collisions with deer per year

One such incident occurred in Georgia when a pilot reported that he was landing the airplane in a strong left crosswind. As the airplane touched down, a deer darted across the runway. The pilot swerved abruptly to avoid the deer and was unable to recover directional control. The left wing dragged the ground and the airplane nosed over when it rolled into a shallow, wide ditch. Luckily, there were no injuries, but the plane was damaged substantially.

Another pilot, in his attempt to avoid a collision, caused the airplane to veer off the right side of the runway into a stand of trees. He probably would have had a better chance with the deer—at least it might have moved!

PHASE OF FLIGHT

Most strikes happen during landing roll (57%) followed by take-off (30%). Only 9% occur on climb and approach combined. Somewhere between 53% and 79% of all deer encounters have



an effect on the flight, from aborted take-off to engines shut down to precautionary landings.

Although only 1% of strikes occur during taxiing, they can be just as serious as other strikes at higher speeds. In December 1994, the pilot of a Cessna 172 lost directional control of his aircraft while taxiing when seven deer crossed in front of the plane. He hit four deer and then hit trees on the west side of the taxi way. The plane was totaled.

State	No. of reported strikes	% of total strikes
PA	26	12
WV	23	11
NY	17	8
MI	18	9
NJ	16	8
WI	9	3
VA	8	4
CT	7	3
MD	7	3
OH	6	3

Table 3. Top 10 states for deer strikes

Month	No. of reported strikes	% of strikes
JAN	9	4
FEB	6	3
MAR	14	7
APR	12	6
MAY	10	5
JUNE	13	6
JULY	17	8
AUG	11	5
SEPT	12	6
OCT	36	17
NOV	51	25
DEC	18	9
TOTAL	209	

Table 4. Number of aircraft collisions with deer per month

DEER TAKE THEIR TOLL

The aircraft was damaged in 81% of all reported deer strikes, and in half of those strikes the damage was substantial. Reports rarely showed the cost of deer related damage: only 12% of the reports indicating damage provided estimates of the cost of repairs and time out of service. Based on the numbers from the strike reports providing damage estimates, the average deer strike cost was $96,800. (Note that this amount does not include accidents from avoiding deer). If we multiply this by the 170 reported damaging strikes, we can estimate that the total cost since 1983 would be $16,456,000. Remember that only about 20% of all strikes are reported so the real total is much higher. Also, none of the strikes in the NTSB database (30% of the total), which were all substantial, had figures for damage.

The most expensive strike reported was to a Hawker-Siddeley worth $1.4 million. The 100 mph-impact tore the engine loose.

THE INVISIBLE DEER

Sometimes pilots might not see the deer or realize one was hit. For example, an instructor pilot was demonstrating night landings to his student when the aircraft veered to the right on touchdown. The instructor thought that the student was on the right rudder, but failed to override him by applying left rudder. The real story wasn't discovered until the next morning. The aircraft had collided with a deer on touchdown and had dragged the deer some distance with the right main gear. This strike, not the student pilot, was what caused the aircraft to veer to the right.

Time of Day	No. of reported strikes	% of strikes
Dawn	3	1
Day	34	16
Dusk	35	17
Night	128	61
Not reported	9	4
TOTAL	209	

Table 5. Number of aircraft collisions with deer by time of day

DEER CENSUS

As mentioned earlier, it is estimated that there are over 24 million white-tailed deer in the United States. Deer populations vary from state to state as do the amount of deer related incidents. It seems that eastern states have the greatest problem. The state having the most deer strikes reported is Pennsylvania (13%) followed closely by West Virginia (11%) and Michigan (9%). Thirty-nine states have reported deer strikes or deer-related accidents with aircraft.

NO FATALITIES - YET

Reported injuries from deer strikes have been few. This may be because it is not one of the items specifically asked for on the FAA forms. The only serious injury reported was in 1992 in Minnesota. The pilot of a Piper Cherokee hit a deer on rotation. When he attempted to turn back to the airport, the plane crashed into some trees 1/4 mile south of the runway. The pilot was seriously injured, and the aircraft was destroyed.

WHAT IS BEING DONE?

What can be done to prevent future deer strikes? Airport managers can request help from professional wildlife biologists who will then assess each airport's particular situation and provide recommendations to solve their problem. In many cases, habitat modification to remove nearby wooded or brushy areas is all that is necessary.

At the present time, chasing deer

off runways with a vehicle before take-offs and landings is the most widely used method. Noise makers are only effective for short periods of time, because deer grow accustomed to them. Harassment and pyrotechnics are used at some airports and have proven to be only partially successful. This is not practical 24 hours a day and not all deer respond to these deterrents.

Fencing has been an effective, but expensive, management tool for excluding deer. Fences must either be between eight and 10 feet tall or, if shorter, electrified. All fences must be maintained so that deer cannot crawl under them. Cattle guards (bars of narrowly spaced steel rod) must be in place at entrances. Smaller airports cannot afford this type of protection. FAA regulations do not require airports to have a fence but only require them to take precautions against entry of large domestic animals onto air operations areas.

Supplemental feeding away from runways or the use of scent repellents can move deer away from the runways. Feeding only works when other food sources are low or unavailable. However, feeding the deer encourages them to stay in the vicinity.

Repellents are needed in large amounts, are expensive and time consuming to apply, and require continuous reapplication. Generally they are not practical.

Deer can be captured and relocated. However, this is labor intensive, can be dangerous, and stresses the deer causing a low survival rate. Deer are extremely territorial and don't do well when placed into new surroundings. Transporting them is just too traumatic. It is also difficult to find new locations that are not already saturated with deer. Furthermore, it is unlikely that all deer can be removed this way.

In recent years several U.S. airports have had to resort to having hunters shoot deer on airports because of the number of deer on the airport property. The number one issue is to enhance airport safety.

AVOIDING DEER STRIKES

How can you avoid a damaging wildlife strike? First of all, know which airports you use are likely to have deer. Check with the appropriate FAA *Airport/Facility Directory* (A/FD) for warnings about deer populations. The Aircraft Owners and Pilots Association's (AOPA) *Aviation USA* also has specific warnings for deer at airports. Second, try to fly during daylight hours as most strikes occur at night and at twilight, especially during autumn. Finally, remember to keep control of your aircraft at all times. Many accidents were caused by pilots being distracted or trying to avoid deer on runways.

REPORT YOUR STRIKES

If you are involved in a deer or other wildlife strike accident, be sure to fill out the FAA Form 5200-7 which can be obtained from local FAA offices, airports, and the AIM, Appendix I. With the help of people reporting all

wildlife strikes, we will eventually have a strong database which can be used to assist wildlife biologists and airport managers to prevent, or at least greatly reduce, future strikes.

Author's Note: I would like to thank the following people for their assistance in providing support for this article: Ed Cleary, FAA Office of Airport Safety & Standards; Satish Agrawal and Tom Hupf, FAA Technical Center; Richard Dolbeer and Andy Montoney, USDA/APHIS/ADC; and Gene Wright, Ohio Department of. Natural Resources.

Ms. Sandra Wright is employed by the U.S. Dept. of Agriculture, National Wildlife Research Center in Sandusky, OH. She manages the FAA's Wildlife Strike Database. The database has had over 15,000 reported wildlife strikes to aircraft since 1989 and is growing by about 2,200 strikes a year. Wildlife includes birds, mammals and reptiles—in fact, any animal involved in an aircraft strike. The tables included in this article are based on information from the FAA Wildlife Strike Database and the NTSB Aviation Accident Database for January 1983 to August 1996.

Phase of flight	No. of reported strikes	% of strikes
Takeoff	63	30
Climb	10	5
Approach	9	4
Landing roll	119	57
Taxi	3	1
Not reported	5	2
TOTAL	209	

Table 6. Number of aircraft collisions with deer by phase of flight

Effect on Flight	No. of reported strikes	% of strikes
Not reported	54	26
Other	63	30
None	44	21
Aborted takeoff	25	12
Precautionary landing	21	10
Engine shut down	2	1
TOTAL	209	

Table 7. Number of aircraft collisions with deer as they affect flight

• Help for "Down Under"

Hi, FAA! On behalf of Southern Air, the small airline (three Britten Norman Islander BN2A aircraft) which services my home of Stewart Island, New Zealand, I'd like to pass on our very sincere thanks for your web site. Southern Air are currently in the throes of writing new Operations Manuals to comply with New Zealand CAA regulations. My printer is running red-hot, printing the relevant parts (FAR 119 and FAR 135) of your FAA handbook.

Our Chief Pilot has had problem trying to contact you by 'phone. He approached me a few hours back to see what I could do on the 'Net. Magic, isn't it? It would be weeks before they had the information they need by mail or untold $$$ to get it via fax.

Your work is helping a very small airline in the South Pacific comply with regulations and maintain their good reputation.

I was "wet finger and windsock" ATC from a van for the Southern Air operation for 12 years. Life's difficult when the $$ from "bums on seats" are low, compared with the service you try to provide. Your Web Pages have made it just that little bit easier.

Again, many, very sincere thanks for the service. As a regulatory body, you probably get a lot of grizzles from "cowboys"—we're small but trying to do our best. You have helped. Keep up the good work! Cheers!

Sam Sampson
Stewart Island, New Zealand

The motto of FAA's Flight Standards Service is "The Highest Safety Standards in the World," but the key to what we in Flight Standards do is the word "service." Our primary service is to our customers here in the U.S., but our standards are so high that the rest of world seeks to emulate us.

We have highlighted FAA home pages in the past, but let us re-emphasize just what you can get from the Certification and Regulation (AVR) and Flight Standards home pages.

The AVR home page—http://www.faa.gov/avr—connects you with all the lines of business under AVR, from Flight Standards to Aviation Medicine to Accident Investigation. You can download handbooks, safety pamphlets from the Aviation Safety Program, articles from FAA Aviation News*, regulations, accident statistics, and much more. You can literally surf for hours among the hyperlinks and discover much aviation safety information from all aspects of FAA.*

Whether it's in the tower, on the ramp, or on the Internet, we really are here to help.

• Outer Markers

The magazine said it was wrong in stating that without an outer marker (OM), an ILS could not be flown. As I understand FAR § 91.175(k), the OM and middle marker (MM) are part of the basic ground components of an ILS. If the OM is inoperative, then other charted methods such as radar, VOR, DME, or other fixes can be substituted for the OM. For example, Manassas (VA) Airport's ILS Rwy 16 has no OM or MM but there are two VOR/radar fixes, one of which serves as a non-precision final approach fix. There is no MM.

With respect to the "Inoperative Components Table" in the approach chart books, the OM and MM are no longer listed. I take that to mean there is now no requirement to increase the charted minimums if one or the other is inoperative as previously required. It does not relate to whether or not the approach can be flown without the OM/MM. FAR § 91.175(k) authorizes designated fixes for this purpose.

To summarize, I think one part of the response in the magazine was slightly misleading. It left the impression an OM was not required for an ILS approach.

This is true except if an OM is part of an ILS approach procedure, and it is inoperable, the approach cannot be executed unless there are charted substitutions or ATC radar to identify the fix at the marker.

Walt Echwald
Falls Church, VA

Thanks for reminding everyone about ILS requirements.

• Stalled engine?

Your January/February 1996 issue was superb. It's visually appealing, it piques curiosity, has sly humor, yet promotes safety without being dull.

The last line of column one, page 9, uses the words "engine stalled and the airplane crashed." For almost the entire history of powered flight (until ca WWII and even up to the present time) the non-aviation press has equated engine "stalls" with crash. Please don't perpetuate this myth.

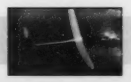
Charley Hayes, CFII
New Lenox, IL

According to the references used for the story about Bessie Coleman, her aircraft engine "stalled."

She was unable to maintain control and crashed. Unfortunately, no more detailed reason for the engine failure was available so we used the 1926 reported cause of the accident. But you are right, many non-pilots think that when an airplane "stalls" its engine or engines have failed, and the aircraft is in danger. Pilots need to do a better job of explaining how an aircraft flies to their friends and the media whenever possible.

Some pilots also try to impress their non-flying friends with tall tales of the "dangers" of flying just to prove how brave or skillful the pilot is, etc. Such tales only perpetuate the myth you brought up.

Some aircraft fly very well without an engine. People who don't believe that fact can ask any sailplane pilot for an explanation. Any sailplane or glider pilot will be happy to explain how it is done.



• Cross-country Requirements

I believe you may have promoted an erroneous interpretation of the FAR in the Flight Forum section of the March 1996 issue of the FAA Aviation News. Specifically, Mr. Pennington's letter and your response imply that cross-country requirements must be given by a rated instrument instructor.

Richard D. Minnis
Aubrey, TX

Mr. Pennington is correct in what he wrote. The regulations require that a CFII must certify that he or she has given the cross-country flight instruction required by FAR § 61.65(c)(4) which includes one cross-country trip of at least 250 nautical miles with the designated approaches. Note: There is no specified amount of time listed for this cross-country training.

The easiest way to answer all of your points is by showing that those magic words "authorized instructor" are contained in FAR §61.65(c) which states, "An applicant for the flight test for an instrument rating (airplane) must present a logbook record certified by an authorized flight instructor showing that he or she has received instrument flight instruction in an airplane in the following pilot operations, and has been found competent in each of them:" Paragraph C has five subparagraphs. Subparagraph (C)(4) then states, "Cross-country flying in simulated or actual IFR conditions, on Federal airways or as routed by ATC, including one such trip of at least 250 nautical miles, including VOR, ADF, and ILS approaches at different airports."

As you can see, there is a CFII cross-country training requirement.

You are correct in that an instrument test applicant can log instrument cross-country flight time in either simulated or actual conditions with someone other than a CFII as long as the flight meets the appropriate FAR requirements. The instrument flight time so logged can be credited toward the 40 hour minimum instrument time required for the rating. This flight time can be logged in simulated instrument conditions with an appropriately rated safety pilot or in actual instrument conditions with an appropriately rated and current instrument pilot who is PIC. The instrument "student" must be appropriately rated in the aircraft.

The FAR only require that 15 of the 40 hours of instrument flight experience be given by a CFII. The remaining 25 hours can be simulated instrument practice with a safety pilot.

• Wait Before You Hunt

I thoroughly enjoy reading *FAA Aviation News* every time it crosses my desk. The articles are interesting, and I never fail to learn from them. The April issue looked promising, but I was disappointed in "Aviation Baseball." I'm an avid hunter and take great pride in the sport and challenges involved. Spotting game from an aircraft and landing to shoot it is not my idea of sport, and I believe it is also illegal.

Edward J. Klonoski, Jr.
Fayetteville, GA

Spotting from an aircraft and landing immediately to hunt is illegal. The law in Alaska says you can spot game and land, but you must wait one day to hunt. We were not clear about that in the article, so thanks for the reminder.

We also received a letter from a reader who wanted the entire staff fired because we "advocate the slaughter of innocent animals." In the April 1996 Alaska issue we published a disclaimer warning people that hunting may be mentioned. Hunting in some parts of Alaska is still for subsistence, and we recognize that as such. Also, as we stated, it is difficult not to talk about Alaska and not mention hunting, but we also try to keep our personal opinions about hunting—pro or con—out of the magazine. For anyone we offended, we apologize.

• Locating the DME

When the FAA put DME on the ILS's, why didn't they put them in reference to the touchdown point? For example, why didn't they put them in the glide slope building?

Bill Henderson
Ft. Lauderdale, FL

That was tried in a few locations, but a problem with using the glide slope building is that it is offset 250 to 600 feet from the runway centerline. Such a site doesn't give as accurate a DME reading as one where the aircraft is flying directly to or away from the DME antenna site. The localizer antenna is one such location that provides a more accurate reading. Any cross angle reading induces some error.

The important thing all pilots need to remember is to always read and understand the information given on a particular approach chart because there may be some differences between DME usage and siting from chart to chart. DME mileage is slant range so the reading can and does vary with altitude.

FAA AVIATION NEWS welcomes comments. We may edit letters for style and/or length. If we have more than one letter on the same topic, we will select one representative letter to publish. Because of our publishing schedules, responses may not appear for several issues. We do not print anonymous letters, but we do withhold names or send personal replies upon request. Readers are reminded that questions dealing with immediate FAA operational issues should be referred to their local Flight Standards District Office or Air Traffic Facility. Send letters to Editor, FAA AVIATION NEWS, AFS-810, 800 Independence Ave., SW, Washington, DC 20591, or FAX them to (202) 267-9463. INTERNET address: Phyllis.Duncan@faa.dot.gov

NEW WEIGHT CATEGORIES FOR WAKE VORTEX SEPARATION

Following two high visibility accidents involving wake turbulence, the FAA conducted a full review of the aircraft weight classification system used with wake vortex separation standards for approach and arrival. This review was conducted by a working group composed of government and industry representatives, including manufacturers, airlines, and pilots. As a result of the working group's recommendations, the weight categories, for the purposes of wake vortex separation standards, have been changed.

The new weight (maximum certificated takeoff gross weight) classification definitions of Heavy, Large, and Small are:

- **Heavy:** Aircraft capable of takeoff weights of more than 255,000 pounds, regardless of weight during any particular phase of flight.
- **Large:** Aircraft capable of takeoff weights of more than 41,000 pounds but less than 255,000 pounds.
- **Small:** Aircraft of 41,000 pounds or less.

To compare, here are the previous weight categories and the new ones:

Previous
Heavy: More than 300,000 lbs
Large: More than 12,500 lbs, less than 300,000 lbs
Small: Less than 12,500 lbs

New
Heavy: More than 255,000 lbs
Large: More than 41,000 lbs, less than 255,000 lbs
Small: Less than 41,000 lbs

This means that 55 aircraft previously in the large category have been moved to the small category. The SF-340 and ATR-42 are less than 41,000 lbs but are classified as large aircraft for the purpose of wake vortex separation. Other aircraft may also be moved from the small to the large class as FAA continues an on-going study of wake vortex separation standards.

For the separation standards themselves, consult a current edition of the *Aeronautical Information Manual.*

AIRSHOW INFORMATION ON THE WWW

FAA's National Air Show Program now has a home page on the World Wide Web. The site contains .pdf files which can be downloaded and read or printed through Adobe Acrobat. There are also instructions on how to download Adobe Acrobat free from the site.

Persons interested in how to obtain an airshow waiver can download chapters of FAA's handbook guidance on the subject as well as copies of the required FAA Form 7711.2, "Application for Certificate of Waiver." (You might want to download, print, and read the handbook chapters first, because they contain an explanation of how to fill the form out correctly.) You can also ask questions and receive replies via e-mail from the FAA National Air Show Coordinator, Ed Robinson.

If you want to "surf" your way to the air show home page from the FAA's main home page (www.faa.gov), click on "Certification and Regulation;" then from the Certification and Regulation home page, click on "Flight Standards." Under "General Aviation" on the Flight Standards home page, you will find the airshow home page. If you want to go directly there, the address is: http://www.faa.gov/avr/afs/ed-home.htm .

AVIATION TRIVIA CONTEST WINNERS

We were pleasantly surprised at the response to the Aviation Trivia question in the May/June 1996 issue. We had 20 responses, and to determine the winners we actually had to look at the time and date stamps on the e-mail or faxes.

The question was who was Gen. Chuck Yeager's back-up in case he would have been unable to make the first Bell X-1 flight. The answer was Bob Hoover. The first three respondants, and winners of an Aviation Safety Program video, were:

Robert D. Barrett, Niceville, FL
Michael McKinley, Des Plaines, IL
Larry A. Wixom, Jamesville, WI

Runners up with the correct answers arriving after the top three were: James W. Schramm, James D. Boylan, Keith Weiner, Martin J. Bradford, John J. Peyton, Barrie C. Hiern, John H. Filhiol, Michael Heffner and Megan McCluer, Louis Rago, Col. Paul H. Lilly, Jr., Rob Baldridge, Dr. Vernon Eugene Osborn, Robert R. Sternecker, and Joseph Datres. Better luck next time.

Thanks to everyone for participating. We only had one incorrect answer, so I guess next time we'll have to come up with something a little more challenging.

If you have any suggestions for trivia questions, please send them (and the answer!) to Editor, *FAA Aviation News*, at the address on the masthead; e-mail the Editor at: Phyllis.Duncan@faa.dot.gov or fax to (202) 267-9463.

DEEP IN THE HEART OF TEXAS

The 1997 Women in Aviation Conference will be held March 13-15, 1997 in Dallas, Texas. The ever-growing conference will present its most ambitious agenda ever, offering IA renewal seminars as well as other Aviation Safety Program seminars, featuring former FAA inspector and NTSB accident investigator Ms. Wally Funk. There will also be seminars on networking and communications skills, aviation jobs, aviation writing, and teacher workshops. Attendees will be offered tours of American Airlines, Southwest Airlines, SimuFlight, and FlightSafety. Exhibitors at the confer-

ence's trade show are expected to top 100.

The keynote speaker on opening day will be Academy Award winning actor, Cliff Robertson, a long-time pilot and aviation enthusiast. The annual luncheon's keynote speaker will be air show pilot and aerobatic champion Patty Wagstaff.

For additional information contact Dr. Peggy Baty of Women in Aviation, International at (513) 225-9440.

GPS TRANSITION PLAN

By 2010 most current ground-based navigation systems could be a part of aviation history. Some systems, such as LORAN-C and Omega, will be "retired" even sooner under the FAA's recently approved Global Positioning System (GPS) Transition Plan.

FAA Administrator David R. Hinson said, "If everything goes as outlined in the plan, an augmented GPS will replace today's ground-based systems that uses technologies dating back to the 1950's." Satellite-based navigation, he continued, "will have a profound effect on aviation. For the first time, pilots using GPS will be able to determine their crafts' precise positions anywhere in the world, whether they are in the air or on the ground."

Under the transition plan, FAA will phase out ground equipment and avionics that support VOR, DME, ILS, NDB, Omega, LORAN-C, and marker beacons. The U.S. will discontinue Omega by the end of the 1997, and Australia plans to discontinue Omega by September 30, 1997. GPS does now and will replace the RNAV function of Omega. LORAN-C service will be ended in 2000.

Hinson said the GPS transition plan represents "a compromise between aircraft operators' desire to get maximum return on their investments in current systems and the FAA's goal of decommissioning" ground-based systems and moving to GPS.

"Moving from the navigation and landing guidance system already in place to a GPS-based system will require air carriers, general aviation, and the military to make significant equipment changes," said Hinson.

Accordingly, the transition plan outlines a transition period of about 10 years. During that time augmentations to enhance GPS accuracy will be put in place, and pilots are expected to increase their experience with GPS, resulting in increased confidence in the satellite-based navigation system.

During the first half of the transition, all ground-based systems will be maintained at full function. In the second part of the transition, ground-based systems will be decommissioned in proportion to the reduction of users but at a level that will support those who have not yet transitioned to GPS. Hinson assured pilots that current ground systems would be decommissioned "only after the aviation community is convinced of the integrity and availability of GPS."

800,000 ATTEND OSHKOSH '96

Good weather, an outstanding variety of showplanes and special programs, plus several record-setting performances highlighted the 44th Annual EAA Fly-In at Oshkosh, WI. Nearly 800,000 people and 11,000 airplanes attended.

Participants came from 76 countries, and more than 1,000 media—including *FAA Aviation News*—were on hand to view the show aircraft and attend the EAA and FAA safety seminars. FAA Administrator David Hinson continued the long-standing tradition called "Meet the Boss," where FAA administrators take any and all questions from the audience. Administrator Hinson also arrived with $1.2 million for expansion of taxiways and improvement to infrastructure at Wittman Regional Airport.

Nearly 2,500 showplanes were registered for the various categories: custom-built, classic, contemporaries, warbirds, ultralights and light planes, rotorcraft, seaplanes, amphibians, replicas, and gliders.

The Fly-In also recognized Korean and Vietnam-Era veterans. Dozens of aircraft from those conflicts flew demonstration flights daily in tribute to the men, women, and aircraft who served in Korea and Vietnam. Test pilots from the past 50 years were also honored during the convention.

Of course, the event everyone was waiting for was the return of Bob Hoover to the Fly-In's schedule of air shows. Hoover flew his Shrike Commander on three different days.

The Fly-In was opened on August 1 with a missing man formation in tribute to Charlie Hillard, the long-time leader of the Christian Eagles who died in a freak accident at the Sun 'n Fun Fly-In this past April.

The Young Eagles celebrated its 225,000th participant during the Fly-In. The raffle of a Jaguar XK8 netted Young Eagles $160,000 toward the program, which hopes to fly 1,000,000 young people by the 100th anniversary of the Wright Brothers' flight in 2003.

Mark your calendars for next year's 45th Annual EAA Fly-In and Convention—July 30 through August 5, 1997. See you there!

CANADIAN WEBSITE

Like its U.S. counterpart, the National Transportation Safety Board, the Transportation Safety Board of Canada (TSB) has gone on the Internet both in English and French. The site lists Canadian safety reports issued by TSB since January 1995 for those maritime, train, pipeline, and aviation accidents investigated by the TSB.

The TSB's Internet access address is http://bst-tsb.gc.ca .

The U.S. NTSB's Internet access address is http://www.ntsb.gov

WORLD AEROBATIC CHAMPIONSHIPS ALMOST A RUSSIAN SWEEP

Aviation's "Olympics of the Air" was held in August in Oklahoma City, OK. Twenty-four teams from around the world came to Oklahoma to participate in the biennial World Aerobatics Championship, and Russia took four of the five awarded trophies.

The Russian Aerobatic Team of Victor Chmal, Nicolai Timofeev, and Oleg Spoljansky won the gold and the Nesterov Trophy for best team performance. France's team won silver, and the U.S. team took the bronze.

A Russian woman, Svetlana Kapanina, won the women's individual gold and the Royal Aero Club trophy; Russian Svetlana Kabatskaya took the women's silver; and the U.S.' Patty Wagstaff won women's bronze. The Russian women's team (Kapanina, Kabatskaya, and Elena Klimovitch) also won gold and the FAI Challenge Cup for best women's team. The U.S. Women's Team (Wagstaff, Diane Hakala, and Linda Meyers-Morrissey) took the silver, and the French Women's Team (Pascal Alajouanine, Sylvie Breton, and Catherine Maunoury) took the bronze.

Chmal also won the Aresti Cup for best individual men's performance and was named "World Aerobatic Champion." Patrick Paris of France was second, and Timofeev was third.

Paris also won the Four Minute Freestyle contest and was awarded the Manfred Strossenreuther trophy;, and Jurgis Kairys of Lithuania was second, Eric Vazeille of France was third, Timofeev was fourth, and Dominique Roland of France was fifth. The highest placing American in the freestyle was Matt Chapman, who was ninth.

The next World Aerobatics Championship is scheduled to be held in 1998, but the site is yet to be determined. The Federation Aeronautique Internationale (FAI) which oversees the contests is awaiting a country to volunteer to host the next champ onships.

INVENTOR OF JET ENGINE DIES

Sir Frank Whittle, a British engineer recognized as an aviation pioneer for his invention of the turbojet engine died August 8. He was 89.

Whittle received his patent in 1930, two years after developing his design. The British Air Ministry rebuffed his ideas for improving aircraft engines as impractical, but in 1936 Whittle was able to convince friends to invest in his own company, Power Jets Ltd.

The British government came on board with Whittle's invention in 1939, and the first British experimental jet flew in 1941, two years after the Germans had flown an aircraft with a jet engine invented by Hans J.P. von Ohain. Although the Germans flew the first jet aircraft, they had little effect, obviously, on the outcome of World War II. Jet aircraft came into their own in the 1950's.

Whittle was knighted in 1948 then moved to the U.S. to conduct jet propulsion research for the U.S. Air Force. He worked for Rolls-Royce engines in the 1960's and consulted on the engines for supersonic transport aircraft in the 1970's. He then moved to Columbia, MD and was a research professor at the U.S. Naval Academy from 1977 to 1979. He is survived by his wife, two sons, and a brother.

GORE COMMISSION ISSUES FIRST RECOMMENDATIONS

The White House Commission on Aviation Safety and Security headed by Vice President Al Gore issued its first recommendations in early September. The Commission consists of individuals from government, the aviation industry, and the public and was assembled to review civil aviation security measures.

On September 9, the Commission recommended increased use of both explosive detection devices and profiling of passengers. President Clinton then asked for a supplemental budget allocation of $429,900,000 to fund the implementation of several of the Commission's recommendations. This appropriation would include just over $91,000,000 for the installation of CTX 5000SP explosives detection systems (EDS) for screening checked baggage and for other explosive detection equipment.

Among the other interim recommendations were more use of bomb-sniffing dogs; automated passenger profiling; increased use of FBI counter-terrorist resources; training personnel at certain overseas airports in anti-terrorism; mandatory full baggage/passenger matching; full manifest requirements with passenger names, passport numbers, and contact telephone numbers (international flights); and improved baggage screening as well as better training of baggage screeners. Another recommendation involved increased background checks of airline employees.

The initial recommendations followed several public and private meetings of the Commission. Several other meetings are scheduled where security for cargo will be discussed, and a final report will be issued in February.

APPLICATION FORM

1997
Flight Instructor and Aviation Maintenance Technician of the Year Award

INSTRUCTIONS:

- Photocopies of this form are acceptable.
- All entries must be typewritten or neatly printed.
- Eligible applicants may submit their own applications or be nominated by another individual.
- Attach application package.

Check One: ❒ Certified Flight Instructor (CFI) ❒ Aviation Maintenance Technician (AMT)

Name: _____

Social Security #: _____

CFI Certificate #: _____

AMT Certificate #: _____

FCC License # (for AMT): _____

Address: _____

City/State/Zip: _____

Home Telephone: _____

Employer: _____

Employer Address: _____

City/State/Zip: _____

Employer Telephone: _____ Fax: _____

Year first designated as a CFI or AMT: _____

Years of Experience: _____

Total Instructional Hours for CFI Applicant: _____

Certificates and Ratings Held: _____

Submitted By:

Name: _____ Date: _____

Address: _____

City/State/Zip: _____

Telephone: _____ Fax: _____

Signature of person submitting nomination: _____

All applications and attached materials become the property of the Selection Committee and will not be returned.

For eligibility, selection criteria, and application procedures, contact the Safety Program Manager at your local Flight Standards District Office. Deadline for applications is December 31, 1996.

U.S. Department
of Transportation

**Federal Aviation
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